

CLAIMS

1. Video coding method of exploiting the temporal redundancy between successive frames in a video sequence **characterized in that** a reference frame, called I-frame, is first approximated by a collection of geometric features, called atoms, and that the following predicted frames called, P-frames, are approximated by the geometric transformations of the geometric features (atoms) describing the previous frame.
2. Video coding method according to claim 1, **characterized in that** the I-frame is approximated by a linear combination of N atoms $g_{\gamma_n}(x, y)$:
$$I(x, y) = \sum_{n=0}^{N-1} c_n g_{\gamma_n}(x, y),$$
 selected in a redundant, structured library and indexed by a string of parameters γ_n representing the geometric transformations applied to the generating mother function $g(x, y)$ and the c_n are weighting coefficients.
3. Video coding method according to claim 2, **characterized in that** the atoms occurring in the decomposition are chosen using the Matching Pursuit algorithm.
4. Video coding method according to one of the claims 1 to 3, **characterized in that** the parameters and coefficients of the atoms are quantized and entropy coded.
5. Video coding method according the claims 4, **characterized in that** the quantization of the parameters and the coefficients can vary across time, and that the variation is controlled by a rate control unit.

6. Video coding method according to one of the claims 1 to 5, **characterized in that** the system is used as a motion prediction, and that the differences between the original frames and the ones reconstructed using the atoms, called the residual images, are encoded using another frame based codec.

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7. Video coding method according to one of the claims 1 to 6, **characterized in that** the geometric features (atoms) of the I-frame are computed from the quantized frames at the encoder and decoder and are not transmitted.

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8. Video coding method according to one of the claims 1 to 7, **characterized in that** the geometric features (atoms) are re-computed after each quantized frame at the encoder and decoder and replace the previous prediction.

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9. Video coding method according to one of the claims 1 to 8, **characterized in that** the geometric transformations used to build the library are composed of translations, anisotropic dilations and rotations, applied to a generating mother function $g(x,y)$ by means of the following change of variables:

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$g_r(x, y) = g(x_n, y_n)$, where

$$x_n = \frac{\cos \vartheta (x - b_1) - \sin \vartheta (y - b_2)}{a_1}$$

$$y_n = \frac{\sin \vartheta (x - b_1) + \cos \vartheta (y - b_2)}{a_2}$$

10. Video coding method according to one of the claims 1 to 9, **characterized in that** the generating mother function is of the following form:

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$$g(x, y) = (1 - x^2) \exp\left(\frac{x^2 + y^2}{2}\right).$$